SAE Aerospace
An SAE International Group

AEROSPACE STANDARD

SAE AS6019

Issued 2012-06

ARC Fault Circuit Breaker (AFCB), Aircraft, Trip-Free 28 VDC

RATIONALE

This specification has been developed to provide a means of compliance for qualification of 28 VDC arc fault circuit breakers or alternate product solutions.

FOREWORD

Thermal circuit breakers are designed to react to the heating effect of current carried by wire; and to protect the wire insulation from thermal damage. These protective devices are not designed to detect or react to the short duration of arcing faults that typically occur outside (before approaching) the defined trip region, or Time versus Current curve, of the thermal circuit breakers.

In addition, arc impedance can reduce low voltage fault current magnitudes appreciably. AFCBs combine active arc fault detection with thermal overload protection into one package. Supplemented with the arc fault detection, the AFCB provides an equivalent level of thermal protection of existing thermal circuit breakers (typically qualified under AS58091), with the added ability to detect and react to arc fault conditions, thereby mitigating damage that will occur to the wiring system by protracted arcing events.

It is important to note that the primary purpose of the AFCB as stated above is to mitigate damage to the aircraft wiring from the circuit breaker to the first serial load element (examples: LRU, transformer, ballast, rectifier, or connected equipment, etc.). In doing so, the potential of igniting surrounding materials is reduced, but not eliminated. Use of AFCBs for hazard mitigation/prevention beyond its intended function of mitigating damage to the aircraft wiring should be carefully analyzed and evaluated.

NOTE: AS58091 was used as the base document for this AFCB specification as such the tables comprehend future amp rating expansion from 1 to 100 A.

SAE Technical Standards Board Rules provide that: “This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user.”

SAE reviews each technical report at least every five years at which time it may be revised, reaffirmed, stabilized, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2012 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AS6019

1. SCOPE

1.1 Scope

The primary function of this specification is to cover the general requirements for 28 VDC manual reset trip-free arc fault/thermal circuit breakers for use in aircraft electrical systems conforming to MIL-STD-704. As a secondary function, this specification may possibly cover the general requirements for AFCBs for use in primary vehicles, other than aircraft, when mounted directly to the structure.

1.2 Classification

AFCBs shall be the Thermal Type, and classified into different styles. Variations from the basic style of each AFCB shall be indicated by the part number from the appropriate specification sheet (see 3.1).

1.2.1 Styles

AFCB styles shall consist of all part numbers covered by one Aerospace Standard or specification sheet. For example:

a. All part numbers of AS6019/1 shall be the same style.

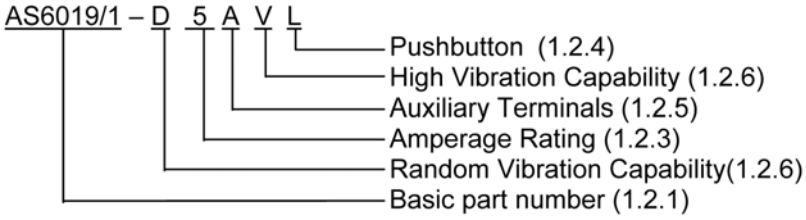
b. All part numbers of AS6019/2 shall be the same style.

The same style classification applies to all Aerospace Standards and specification sheets covered by this specification.

1.2.2 Part Number

The part numbers for AFCBs in accordance with this specification shall conform to part number scheme below. Alphanumeric characters shall be used to designate variations from the basic style of each circuit breaker.

Example of part number scheme:



When a designator for a variation is not applicable it shall be omitted from the part number. Not all letters are applicable for every specification sheet. Refer to the latest specification sheet and QPL for available and qualified configurations.

1.2.3 Amperage Ratings

The amperage rating designator shall be a number specified in each specification sheet to indicate the nominal amperage rating for overload protection.

1.2.4 Pushbuttons

The AFCB pushbutton shall be designated as follows. Standard length pushbutton, as specified in the specification sheet shall have no designator letter.

L - Extra length pushbutton (see 6.3.9)

1.2.5 Auxiliary Switch Terminals

The use of auxiliary switch terminals when allowed by the specification sheet shall be designated as follows. AFCBs with standard terminals only, as specified in the specification sheet, shall have no designator letter.

A - Auxiliary switch terminals

1.2.6 Vibration Level

The vibration level of the AFCB shall be specified in the specification sheet and shall be indicated in the part number by one or more of the following designators. Standard sine vibration capabilities shall have no designator (see 4.7.11.2).

V - High Level sine capabilities (see 4.7.11.3).

C thru K - Random vibration capabilities (see 4.7.11.1).

1.2.7 Mounting Configurations

Unless otherwise specified, the AFCB mounting configuration shall be designated as follows. Standard bushing mounted circuit breakers shall have no designator.

P - Cover-plate mount.

2. APPLICABLE DOCUMENTS

The present revision of these documents is applicable unless otherwise specified by contract.

2.1 Government Specifications, Standards, and Handbooks

2.1.1 The following specifications, standards, and handbooks form a part of this specification to the extent specified herein.

MIL-I-24768/17 Insulation, Plastic, Laminated, Thermosetting, Glass-Cloth, Silicone-Resin (GSG)

MIL-DTL-81381 Wire, Electric, Polyimide Insulated, Copper or Copper Alloy

MIL-HDBK-454 General Guidelines for Electrical Equipment

MIL-I-24768/1 Plastic Sheet, Laminated, Thermosetting, Glass cloth Melamine Resin

MIL-STD-104 Limit for Electrical Insulation Color

MIL-STD-1285 Marking of Electrical and Electronic Parts

MIL-STD-1916 DOD Preferred Methods for Acceptance of Product

MIL-STD-202 Test Methods for Electronic and Electrical Component Parts

MIL-STD-704 Aircraft Electric Power Characteristics

MIL-STD-810 Environmental Engineering Considerations and Laboratory Tests

MIL-STD-889 Dissimilar Metals

(Copies of specifications, standards, handbooks, drawings and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)